We claim:

1. An adaptive quality control loop for rate adaptation comprising in the step of:

adjusting a first channel condition threshold based on a first error detection result for a first data packet transmission between a transmitter and a receiver using a first variable step, wherein the first channel condition threshold is associated with a first modulation and coding scheme (MCS) level used in the first data packet transmission.

2. The adaptive quality control loop of claim 1, wherein the step of adjusting the first channel condition threshold comprises the step of:

determining the first variable step using a desired MCS error rate for the first MCS level.

3. The adaptive quality control loop of claim 2, wherein the step of determining the first variable step comprises the step of:

updating MCS probabilities for all MCS levels using the first error detection result;

updating an MCS error rate for the first MCS level; and

determining a ratio between a first variable up step and a first variable down step associated with the first variable step using the updated MCS probabilities, MCS error rate and a target criterion.

4. The adaptive quality control loop of claim 2, wherein the desired MCS error rate for the first MCS level is based on a block error rate target criterion.

5. The adaptive quality control loop of claim 2, wherein the desired MCS error rate for the first MCS level is based a block error rate target criterion, MCS probabilities for the first MCS level and for other MCS levels, and MCS error rates for the other MCS levels.

6. The adaptive quality control loop of claim 5, wherein the desired MCS error rate is determined by solving

$$p_d(m) = \frac{1}{P(m)}\left[P_{BLER}^{Target} - \sum_{n=1, n\neq m}^{M} p(n)P(n)\right]$$

where $p_d(m)$ is the desired MCS error rate, $P(m)$ is the MCS probability for the first MCS level, P_{BLER}^{Target} is the block error rate target criterion, $p(n)$ is the MCS error rates for a particular MCS level n, and $P(n)$ is the MCS probability for a particular MCS level n.

7. The adaptive quality control loop of claim 2, wherein the desired MCS error rate for the first MCS level is based on a bit error rate target criterion.

8. The adaptive quality control loop of claim 2, wherein the desired MCS error rate for the first MCS level is based a bit error rate target criterion, MCS probabilities for the first MCS level and for other MCS levels, data rates for the first MCS level and for the other MCS levels, and MCS error rates for the other MCS levels.

9. The adaptive quality control loop of claim 5, wherein the desired MCS error rate is determined by solving

$$p_d(m) = \frac{1}{R(m)P(m)}\left[P_{BER}^{Target}\sum_{n=1}^{M} R(n)P(n) - \sum_{n=1,n\neq m}^{M} R(n)p(n)P(n)\right]$$

where $p_d(m)$ is the desired MCS error rate, $P(m)$ is the MCS probability for the first MCS level, P_{BER}^{Target} is the bit error rate target criterion, $p(n)$ is the MCS error rate for a particular MCS level n, $R(m)$ is the data rate for the first MCS level, $R(n)$ is the average transmitted data rate for a particular MCS level n, and $P(n)$ is the MCS probability for a particular MCS level n.

10. The adaptive quality control loop of claim 1, wherein the step of adjusting the first channel condition threshold comprises the step of:

determining the first variable step using a block or bit error rate target criterion and a first data rate associated with the first MCS level.

11. The adaptive quality control loop of claim 1, wherein the first variable step is associated with a first variable up step and a first variable down step, the first channel condition threshold being increased an amount based on the first variable up step if the first error detection result indicates the first data transmission was unsuccessful, the first channel condition threshold being decreased an amount based on the first variable down step if the first error detection result indicates the first data transmission was successful.

12. The adaptive quality control loop of claim 11, wherein a ratio between the first variable up and down steps satisfy

$$\frac{\Delta_{\mathrm{Up}}(m)}{\Delta_{\mathrm{Down}}(m)} = \frac{1-\mathrm{p_d}(m)}{\mathrm{p_d}(m)}$$

where $\Delta_{\mathrm{Up}}(m)$ is the first variable up step for the first MCS level, $\Delta_{\mathrm{Down}}(m)$ is the first variable down step for the first MCS level, and $\mathrm{p_d}(m)$ is a desired MCS error rate for the first MCS level.

13. The adaptive quality control loop of claim 11, wherein the first variable up and down steps are determined by solving

$$\Delta_{\mathrm{Up}}(m) = \mu\left(1-\mathrm{p_d}(m)\right)$$

$$\Delta_{\mathrm{Down}}(m) = \mu \mathrm{p_d}(m)$$

where $\Delta_{\mathrm{Up}}(m)$ is the first variable up step for the first MCS level, $\Delta_{\mathrm{Down}}(m)$ is the first variable down step for the first MCS level, μ is a positive constant, and $\mathrm{p_d}(m)$ is a desired MCS error rate for the first MCS level

14. The adaptive quality control loop of claim 11, wherein a ratio between the first variable up step and first variable down step are based on a desired MCS error rate for the first MCS level.

15. The adaptive quality control loop of claim 1 comprising the additional steps of:

adjusting a second channel condition threshold based on a second error detection result for a second data packet transmission using a second variable step, wherein the second first channel condition threshold is associated with a second MCS level used in the second data packet transmission.

16. The adaptive quality control loop of claim 15, wherein the first variable step is based on the first error detection result and the second variable step is based on the second error detection result.

17. The adaptive quality control loop of claim 1 comprising the additional steps of:

selecting a second MCS level based on an estimate of channel condition between the receiver and transmitter using a table having the adjusted first channel condition threshold.

18. The adaptive quality control loop of claim 17 comprising the additional steps of:

transmitting a second data packet using the second MCS level.

19. The adaptive quality control loop of claim 1, wherein the step of adjusting the first channel condition threshold is performed at the receiver.

20. The adaptive quality control loop of claim 1, wherein the step of adjusting the first channel condition threshold is performed at the transmitter.